



Tensile Fabric Roof Structures

PTFE Coated Glass Cloth



Materials

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PTFE (Teflon) coated glass cloth has become established as the highest quality architectural membrane for tensile structures. The material was developed by DuPont in the 1960's and has been used on structures since the early 1970's. The original 25 year design lifespan of the material has already been exceeded by the earliest structures, and present day expectations are for 30-50 year lifespans.

PVC coated polyester has been used as an economical alternative to PTFE cloth, typically achieving savings of £50-70 per m² on construction costs. The lifespan of PVC coated polyester is typically 15-20 years.

Each fabric is available in various strength ranges, and selection is primarily an engineering-based decision. The thicker fabrics typically have a tensile strength of 150kN per metre, while the lighter grade fabrics have tensile strength of 75-100kN per meter. The heavier grade fabrics have light transmission rates of 9-12%, while the lighter grade fabrics allow 14-16%.



Thermal Performance

The insulative properties of PTFE coated glass cloth is similar to the performance of conventional glazing. This equates to a U Value of approx 4.0 - 5.0 for a single layer membrane, and 2 - 2.5 for a twin layered membrane. Twin layered membranes have a light transmission level of approximately 50% of a single skin structure.

Insulated sandwich systems have been developed by Architen to achieve very high levels of thermal performance. These equal the highest standards achieved by well insulated conventional construction, equating to a U-value of 0.2

Solar Performance

The typical characteristics of single skin tensile fabric roofs to sunlight are approximately 75% reflection, 10% absorption and 15% transmission.

Fire Performance



All Teflon coated glass cloths are inherently non-flammable and achieve Class 1 in surface spread of flame testing and Class 0 performance in BS476 pt6 Fire Propagation tests.

Life

PTFE is actively bleached by UV light, which has the effect of maintaining a bright white appearance in the long term. The Teflon coating provides a chemically inert layer which resists the build up of environmental pollution. The material has been extensively tested both in the laboratory and out in the field and no degradation or loss of strength is observed. The material does not become brittle or discolour over time. It is anticipated that the material has a life in excess of 30 years.

Acoustics

As a lightweight material with limited mass, PTFE fabric roofs are acoustically relatively transparent, but provide a degree of absorption and noise attenuation. The inclusion of an insulated layer greatly enhances the acoustic attenuation of a tensile roof, particularly for mid to high frequency noise sources. This is particularly helpful for lessening the ringing reverberant din that can affect courtyard and atrium environments.

Cleaning

PTFE coated glass roofs are extremely low maintenance due to the cleaning action of rain on the Teflon outer layer. Typically, cleaning is recommended every 2-5 years, depending on the location of the structure and its exposure to environmental pollution. The fabric is sufficiently strong to support a man's weight on its surface, so cleaning simply requires the incorporation of man-safe systems to access the roof surface. Cleaning is usually by means of jet-washers, soft brushes and water with a mild detergent. PTFE roofs do need to be cleaned internally.

Weight

Single skin PTFE roofs typically weigh 1.5kg per m² , and thermal sandwich roofs typically weigh 3.5kg per m² .

Membrane Panel size

Tensile membranes can be manufactured to virtually any size and shape up to 1600m² in a single panel. The membrane is made up from seam welded sections which are laser-cut into precise patterns. PTFE fabric is usually seamed at widths of 1.5m to 2.5m, with virtually no limit in length. Spans exceeding 60m are achievable, although rare, and potentially requiring reinforcement with structural cables. Fabric panels are pre-assembled in controlled factory conditions and packed for deployment in situ. A 200m² panel will typically weigh approximately 300kg, and may be lifted into position by a modest crane.

Warranties

We are happy to warranty our system as required. The maximum warranty we have offered to date is 12 years. We generally advise that any warranty should be back to back with a maintenance agreement to ensure that structural connections, moving parts and points of high structural loading are well maintained.



Typical Specification

Architectural Membrane	PTFE Coated Glass Cloth		
Coating	Polytetrafluoroethylene		
Base Fabric	Woven EC6 glass		
	Value	Unit	Test Method
Coated Fabric Weight - (nom.+/- 5%)	1100	g/m ²	DIN EN 22286
Thickness - (nominal)	800	Micron	DIN EN 22286
Strip Tensile-Dry			BS 3424 Part 4 Method 6 or DIN 53354
warp-(min.)	5000	N/5cm	
fill- (min.)	5000	N/5cm	
Coating Adhesion-(min)	75	N/5cm	BS 3424 Part 7 Or DIN 53357
Elongation at break			
warp-	4.0%		
fill-	4.0%		
Solar Transmission	55%		ASTM E-424-71
Solar Reflectance	n.a.		ASTM E-424-71
Available Width	1.40	m	
Color	White (after exposure to sunlight)		
Fire Performance			
External Fire Exposure Roof	Class AA	BS 476: Part 3	
Fire Propagation	Class 0	BS 476: Part 6	
Spread of Flame	Class 1	BS 476: Part 7	

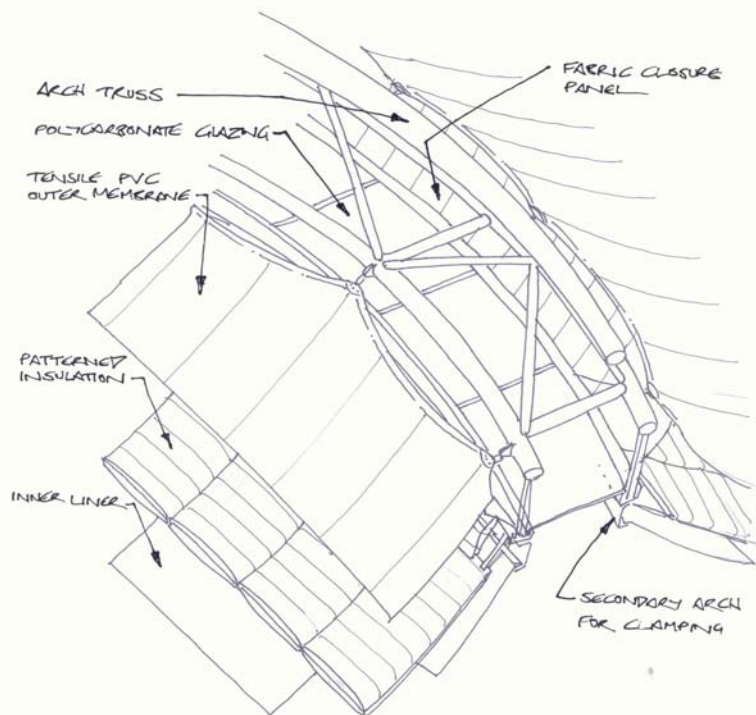


Insulated Sandwich Systems

These are twin skin designs that incorporate foil sandwich systems to achieve extremely high thermal insulation, while retaining the light weight and clear spanning benefits of tensile fabric.



Exterior view of Chatham structure. Roof achieved U value of 0.2 - 0.25 W/m²



Construction Diagram